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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/245,269	02/05/1999	JACK A MANDELMAN	99P7451US	4716
530	7590	10/06/2003	EXAMINER	
LERNER, DAVID, LITTENBERG, KRUMHOLZ & MENTLIK 600 SOUTH AVENUE WEST WESTFIELD, NJ 07090			NGUYEN, DILINH P	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/245,269

Applicant(s)

MANDELMAN ET AL.

Examiner

DiLinh Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 21-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,21-24 and 26-32 is/are rejected.
- 7) ☒ Claim(s) 25 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 23-24 are objected to because of the following informalities:

In line 3 of claims 23 and 24, the phrase: "... said bottom of said trench..." should be changed to --said bottom of said isolation trench--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 21-22, 24, 26-30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (U.S. Pat. 5306940) and Kinney et al. (U.S. Pat. 5179038) in view of Kagaya et al. (U.S. Pat. 5523593).

- Regarding claims 1 and 27, Yamazaki discloses a semiconductor body (figs. 4A-4B, column 10, lines 45 et seq.) containing at least one semiconductor structure, the semiconductor body comprising:
an isolation trench 112 formed in the semiconductor body 101 and having a bottom and sidewalls, the isolation trench enclosing an area of the semiconductor body which contains the semiconductor structure;

a lower portion of the isolation trench being at least filled with an element 115c, sidewall portions of the element 115c being at least partly separated from the sidewalls of the lower portion of the isolation trench by a first electrical insulator 113; and

a remaining portion of the isolation trench filled with a second electrical insulator 116a.

Yamazaki fails to disclose a lower region of the electrically conductive material being in electrically contact with the semiconductor body at the bottom of the isolation trench.

Kinney et al. disclose a semiconductor device (figs. 6-7, column 5, lines 50 et seq.) comprising:

an isolation trench 70; an electrically conductive material 80; side walls 78, wherein a lower region of the electrically conductive material being in electrically contact with the semiconductor body at the bottom of the isolation trench. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Yamazaki to prevent the formation of parasitic transistors and unwanted conductive channels in the trench side walls and provide a high density semiconductor structure, as shown by Kinney et al.

Yamazaki and Kinney et al. fail to disclose the semiconductor structure is electrically isolated from other semiconductor structures that are also contained within the semiconductor body but which are not located within the enclosed area.

Kagaya et al. disclose a semiconductor device (cover fig., abstract) comprising: a trench 9 enclosing an area of the semiconductor body which contains a semiconductor

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structure so that the semiconductor structure is electrically isolated from other semiconductor structures that are also contained within the semiconductor body but which are not located within the enclosed area to reduce low frequency oscillation and provide a compound semiconductor IC which is most suitable for a superspeed operation. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Yamazaki and Kinney et al. to reduce low frequency oscillation and provide a compound semiconductor IC which is most suitable for a superspeed operation, as shown by Kagaya et al.

- Regarding claims 2 and 28, Kinney et al. disclose the electrically conductive material 80 includes doped polysilicon (column 5, line 68 and column 2, lines 50-55).
- Regarding claims 21 and 29, Yamazaki discloses the first electrical insulator 113 includes silicon dioxide (column 10, line 65).
- Regarding claim 22, Yamazaki discloses the second electrical insulator 116a includes silicon dioxide (column 11, line 35).
- Regarding claims 24 and 32, Kinney et al. disclose a region of the semiconductor body 62 that is adjacent to the bottom of the isolation trench is of a same conductivity type (P-type) as the electrically conductive material 80 (fig. 7).
- Regarding claims 26 and 30, Yamazaki and Kinney et al. disclose the side wall electrical insulator includes undoped polysilicon.

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3. Claims 23 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki (U.S. Pat. 5306940) and Kinney et al. (U.S. Pat. 5179038) in view of Kagaya et al. (U.S. Pat. 5523593) and further in view of Manning (U.S. Pat. 5801423).

Yamazaki, Kinney et al. and Kagaya et al. fail to disclose a region of the semiconductor body that is adjacent to the bottom of the trench is more heavily doped than a remaining portion of the semiconductor body.

Manning discloses a semiconductor device (fig. 6A) comprising: a region 115 of the semiconductor body that is adjacent to the bottom of the isolation trench is more heavily doped than a remaining portion of the semiconductor body 67 (column 5, lines 39-41). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the device of Yamazaki, Kinney et al. and Kagaya et al. to improve latchup immunity and reduce the lifetime of the minority carriers for the semiconductor device, as shown by Manning.

Allowable Subject Matter

Claims 25 and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

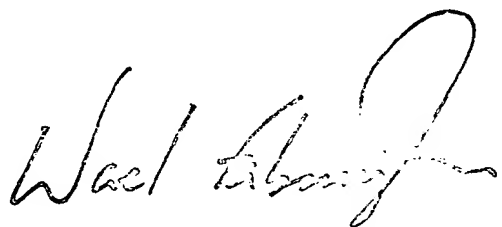
Any inquiry concerning this communication or earlier communications from the examiner should be directed to DiLinh Nguyen whose telephone number is (703) 305-6983. The examiner can normally be reached on 8:00AM - 6:00PM (M-F).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DLN
September 20, 2003


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2814